COBB TUNING™

AccessTUNER

Nissan Z & Infiniti G
Table Descriptions and Tuning Tips
v1.02

 

Nissan Z & Infiniti G
Tuning Guide and Table Definitions

This tuning guide is broken into the basic components of tuning a Nissan 350Z / 370Z and Infiniti G35 / G37 and the tables associated with each of these components. For each major tuning category the guide outlines basic tuning strategies and defines tables within this category (for example, Cam timing, Fueling,and Ignition timing).

Note: Table list varies from ECU to ECU. Some tables may not be available for some ECUs.

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Tuning Guide

Step 1 – What is the mechanical configuration of the vehicle?

The first step in tuning is to choose a Cobb Tuning base table that best matches the components of the vehicle to be tuned.

The Stage1 calibrations are designed for vehicles with stock or aftermarket cat-back exhaust system. The Stage2 calibrations are designed for vehicles with a high-flow catalytic converters or “race” pipes that remove the factory catalytic converters. This major difference in configuration impacts the pumping efficiency of the engine and critically impacts all major aspects of tuning (cam, fuel, and ignition).

Step 2 – What fuel is the vehicle using?

Note that COBB Tuning offers calibrations currently designed for 91 octane. The higher the octane the higher the fuel quality. Higher octane burns slower and can support higher cylinder pressure. This difference in fuel will determine how the car is tuned. Keep in mind the Nissan ECU has some capacity to optimize its own ignition advance curve (within limits) based on knock sensor feedback. Higher octane fuels support more ignition timing and leaner air to fuel mixtures compared to lower octane. Using a map designed for high octane with low octane fuels can produce engine damage.

Step 3 – What type of air intake is on the vehicle?

The VQ platform utilizes a mass air flow (MAF) sensor located downstream to the air filter and before the throttle body to measure the amount (mass) of air entering the engine. This air flow measurement IS CRITICAL for ignition timing, fuel and camshaft phasing calculations. This sensor reports the amount of air entering the engine and this is used to determine load. Many tables inside the ECU use a Theoretical Pulsewidth (load) and engine speed as axis. Therefore, it is the MAF sensor reading and calculated load that determines the table values used to control the engine.

The MAF sensor readings depend entirely upon the type of intake system. aftermarket intakes rarely promote laminar airflow around the MAF sensor that is equivalent to the stock system. As a result, the stock MAF sensor calibration is not appropriate for most aftermarket intakes. If an aftermarket intake is used the tuner will have to spend considerable effort to ensure that the MAF sensor scaling matches the true airflow characteristics of the chosen intake. We highly suggest that the initial tuning is done with the stock intake system so that a proper tune can be established with a known MAF sensor calibration. Once the tune is optimized for the stock intake the aftermarket intake can be installed and only those components of the tune related to this intake change need be altered.

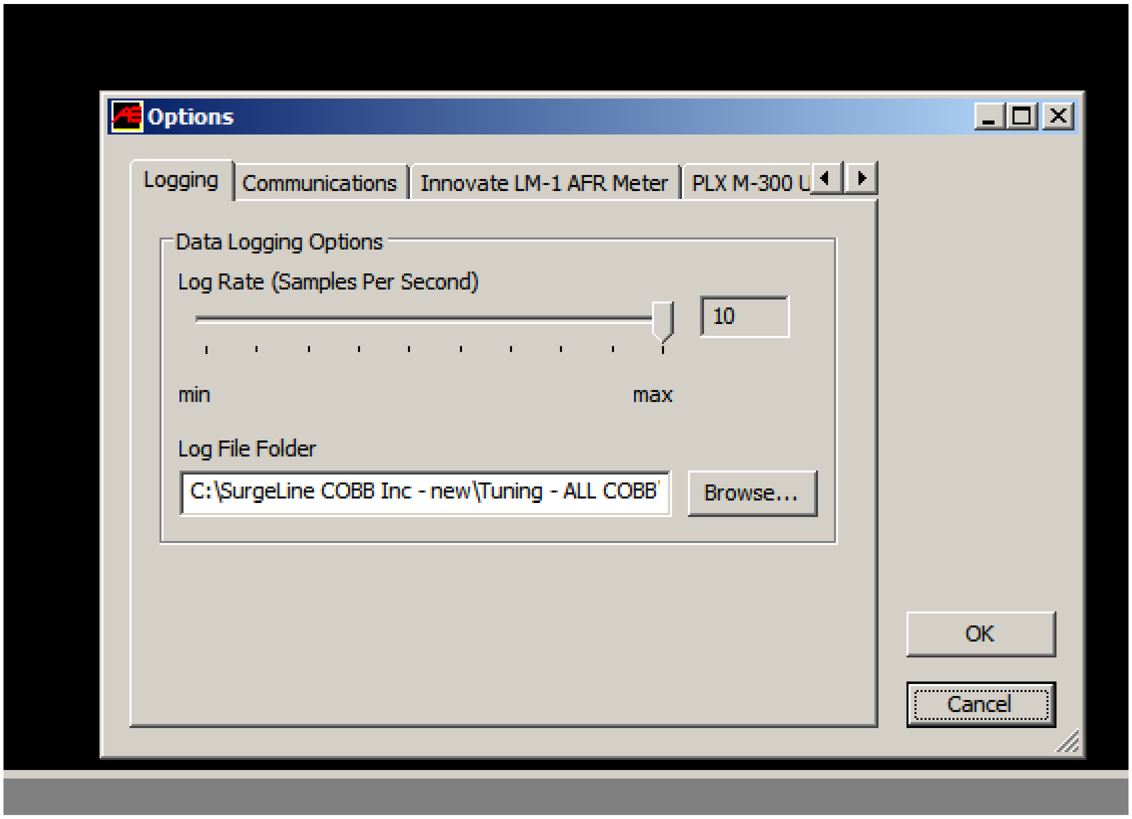
Step 4 – Calibration refinement on a chassis dynamometer.

A: Perform initial testing.

After choosing the most appropriate starting point calibration, prepare to test and refine the calibration on a chassis dynamometer.

B: Connect the AccessTUNER software to the AccessPORT equipped vehicle.

Open the selected starting point calibration in the AccessTUNER software. Configure the AccessTUNER software to connect to your vehicle. Attach the OBDII dongle to the vehicle and the associated USB cable to your computer. Press “Ctrl F” to configure the program. Select the directory in which to store your data logs under the “logging” tab. Select the type of tuning cable and its associated com port under “communications”. You can also integrate a wideband O2 (WBO2) sensor signal into the data logs. Select the specific oxygen sensor you wish to use and indicate its associated com port.



C: Log critical engine parameters while testing.

AccessTUNER software allows the user to sample and record critical engine parameters. This data includes sensor information and commanded engine function. Open AccessTUNER and load the calibration currently flashed into the AccessPORT. Attach the OBDII cable to the vehicle and the computer. With the vehicle ignition on, press “Ctrl L” to connect to the active ECU. If AccessTUNER is connected to the vehicle the message in the lower right corner of the program will read “on-line”. Press “Ctrl F” to configure the logged parameters and those displayed in the AccessTUNER “Dashboard”. The dashboard is a screen that reports active engine and sensor parameters. This screen is the single best way to assess the condition of the engine during tuning. It is critical to actively monitor these parameters while tuning. These data allow the tuner to determine if a calibration is performing correctly. Accurate and deliberate assessment of logged parameters is the only way to avoid conditions that may damage the engine.

Below is a list of logged parameters for the Z and G vehicles. Please note that there are some differences between what can be logged on the earlier models versus the later (HR engine) models.

For the earlier cars (VQ35DE inc. Rev Up) the logging rate is 10 Hz when logging 10 parameters. For the later cars (HR engines), you can log up to a maximum of 14 parameters at a time at 10 Hz.

The following parameters can be logged using the AccessTUNER software:

A/F Alpha – (ALL) A version of the LTFT value used to make global fuel adjustments necessary to achieve the A/F targets while in closed loop.

A/F Ratio – (2004.5-newer) The A/F (Lambda) ratio as measured by the front O2 sensors. Listed as Air Fuel B1/2 and Ave AFR in some models.

Base Fuel Schdl – (non-HR) An internally calculated value used by the ECU to represent engine load.

Battery (V). – (ALL) Voltage of battery measured at the ECU.

Engine Coolant Temp. – (ALL) Sensor value of coolant temperature measured in the engine block.

Engine Oil Temp – (ALL) Actual engine oil temperature as measured in the engine.

Engine RPM – (ALL) Engine speed (revolutions per minute).

Exhaust Valve Timing – (when equipped) Degrees of exhaust camshaft phasing retard.

Fuel Temp. – (non-HR) Fuel temperature measured inside the fuel tank.

Ignition Timing – (ALL) Ignition timing in degrees before top dead center. This is the final actual commanded ignition timing after all correction and adjustments.

Injector Pulse Width – (ALL) The duration of total injector on-time including any compensations and latency.

Intake air temp – (ALL) Sensor value to intake air temperature measured at the MAF sensor.

Intake Valve Timing – (non-VVEL) Degrees of intake camshaft phasing advance.

LTFT – (ALL) The Long Term Fuel Trim or learned trim that has been required to achieve A/F targets while in closed loop.

Mass Air Flow – (ALL) The net result of the amount of air being measured by the MAF sensors (a sum of both sensor results for HR engines).

Mass Air V. – (ALL) Mass Air Flow sensor voltage. HR engines will display 2 parameters since these vehicles utilize dual MAF sensors.

STFT – (ALL) The Short Term Fuel Trim or instant trim required to achieve A/F targets while in closed loop.

Throttle Position % – (ALL) Throttle opening percentage.

Vehicle Speed – (ALL) The current speed as measured by the ABS system and reported to the ECU.

D: Tuning for appropriate Air to Fuel ratios

The ideal air to fuel ratio depends upon fuel quality. Higher octane fuels are more detonation resistant and therefore can be run at leaner air to fuel ratios. Leaner Air to Fuel ratios produce higher power but also create more heat. Excessive heat can lead to detonation. Lower octane fuels such as 91 and ACN91 (Arizona, California and Nevada 91 octane) are more prone to detonation and therefor require a richer air to fuel ratio. Rich air to fuel ratio combustion produces less heat and therefore less detonation. We have found that the VQ engine (when naturally aspirated) tends to product best torque when using mid to high 12 Air to Fuel ratios.

Several tables directly impact fuel ratio in these cars. “Primary Fuel” is the primary table dictating open loop fuel mixtures. These tables are referenced by Theoretical Pulsewidth (load) and engine speed. By logging “Injector Pulsewidth” and engine RPM you will be able to identify the portions of the tables that need to be edited to produce desired fueling.

A Fuel mixture that is too lean will contribute to uncontrolled combustion, excessive heat, detonation and possible engine damage. The objective is to run the car at the richest Air to Fuel mixture possible that does not sacrifice power. Ultimately, the best Air to fuel ratio can only be determined in concert with changes to ignition timing. For example, some cases a comparatively rich Air to fuel mixture can be run with more ignition timing than a leaner mixture. This combination may produce higher power than a lean mixture with less ignition timing. Generally speaking, the air to fuel and ignition timing combination that produces the best power while minimizing heat is the desired calibration. Of course this ideal is not limited to ignition timing and fuel but is also a balance of variable cam timing and, in the case of a forced induction setup, boost pressure.

E: Tuning Ignition Timing

The most important tables for ignition timing are “Ignition High Det” and “Primary Ignition”. Generally speaking, higher ignition timing supports higher torque and greater power. However, ignition timing should be increased with great caution. Higher timing advance can yield higher cylinder pressures and this is limited by fuel quality and the mechanical limitations of the engine. Too much timing advance may produce knock when fuel quality is limiting. High ignition advance should ONLY be added when its addition produces a measurable increase in torque and power. If increased timing does not increase torque the extra cylinder pressure is simply producing unnecessary stress on engine components.

Keep in mind the values used in Nissan's ignition tables do not represent actual BTDC timing values. Instead, they are to represent a value related to the fuel's “burn time” or combustion time necessary to reach a peak cylinder pressuring occurring a pre-determined timing ATDC where peak torque will occur. This value has been dictated by Nissan and is built into the ECU via a complex algorithm used to calculate a final ignition timing value. You can log this value when tuning to help understand the net result of your changed in degrees BTDC. This difference may take some getting use to, but the end result is still the same. Higher values result in more ignition advance (ie: you are saying the fuel takes longer to burn so fire the spark earlier = more advance).

F: Tuning variable Cam Timing

There are variable camshaft tables that independently control intake and (when equipped) exhaust cams. The tuning of these tables can vary significantly based on the modifications made to the vehicle. What may be ideal on a stock vehicle may not be on a vehicle with significant exhaust and intake modifications, or likewise when using a forced induction upgrade. Great rewards can be had by developing an optimal cam timing tune, but it does take a high degree of patience and trial and error in order to get it "right". Using a load-based dyno is a real benefit and time save when tuning these tables.

G: Integrating all tuning parameters for the ideal Calibration

The ideal calibration for your Z or G is a combination of all major tuning areas outlined above. Generally speaking, the VQ engine will make the most power when run lean with the maximal amount of ignition timing that the ECU will allow without detonating. However, this ideal of approximately 12.5:1 air to fuel ratio and high ignition timing is not realistic for all configurations and fuels. The only way to determine if a calibration is ideal is to run the car on a chassis dynamometer where the impact of calibration changes are easily measured. For example, addition of ignition timing that does not result in increased torque is a not ideal. If additional timing does not create power then you are simply adding stress to the engine components without tangible benefit. The same is true of air to fuel ratio and (when using forced induction) boost. If you can run the vehicle at a richer air to fuel ratio without losing power this is more ideal than running the car lean. If increasing timing does not yield considerable power gains then leaving it so highly advanced may make the engine more knock prone or sensitive to subtle changes in fuel quality. The goal is to have an engine that runs consistently day to day and doesn't require a constant level of attention in order to run properly.

AccessTUNER Program shortcuts:

Ctrl L – Initiate live tuning, connect to or disconnect from a the ECU
Ctrl F – Configure Program
- when Offline configures communication settings and WBO2 integration
- when Online configures logged parameters for dashboard and saved data logs

Ctrl D – Initiate and terminate data log
Ctrl T – Initiate or terminate live tracing in tables
Ctrl Alt S – Save AccessTUNER Pro calibration
Ctrl Alt A – Save AccessTUNER Race calibration
Ctrl Alt O – Open AccessTUNER Pro calibrations
Ctrl Alt E – Open AccessTUNER Race calibrations
Ctrl A – Open advanced calibration settings – activate or deactivate Check Engine Lights (CEL)
Ctrl G – Change ECU
Ctrl K – Revert to stock calibration

Table editing shortcuts:
E – Direct edit
H – Horizontal interpolation of selected tables
V – Vertical interpolation of selected Tables
M – Multiplication of selected tables by factor of x

Table Descriptions

Cam Calibration Tables

Intake Cam. Advance

This is a table used to alter the amount of intake camshaft advance to run based on Engine Speed (RPM) and Engine Load (Theoretical Pulsewidth). The table values represent the degrees of advance the intake camshaft will run.

Tuning Tips – Camshaft phasing is very difficult to tune accurately without the use of a load-based dyno. Careful tuning can significantly impact both performance and fuel economy, though the window of opportunity to do so is very narrow and based on several conditions. This is why it is best tuned using equipment such as a load-based chassis dyno to help quantify the results.

One method some use to validate their cam phasing tuning is to compare the Mass Air Flow logged when making cam phasing adjustments. If efficiency is improved, you will normally log a higher Mass Air Flow value for a given condition (Engine RPM and throttle position). This must then be validated with the use of a dyno.

Exhaust Cam. Advance (when equipped)

This is a table used to alter the amount of exhaust camshaft advance to use based on Engine Speed (RPM) and Engine Load (Theoretical Pulsewidth). The table values represent the degrees of phasing the exhaust camshaft will run.

Tuning Tips – Camshaft phasing is very difficult to tune accurately without the use of a load-based dyno. Careful tuning can significantly impact both performance and fuel economy, though the window of opportunity to do so is very narrow and based on several conditions. This is why it is best tuned using equipment such as a load-based chassis dyno to help quantify the results.

One method some use to validate their cam phasing tuning is to compare the Mass Air Flow logged when making cam phasing adjustments. If efficiency is improved, you will normally log a higher Mass Air Flow value for a given condition (Engine RPM and throttle position). This must then be validated with the use of a dyno.

Fuel Tables

Intake Calibration:

Mass Air Flow Sensor Calibration

The primary calibration table for the Mass Air Flow sensor. The calibration table is referenced by the voltage generated by the Mass Air Flow sensor, the table values represent the grams per second of air that is passing across the sensor. The Mass Air Flow sensor works within a 0-5 volt range.

Tuning Tips – This calibration needs to be altered when using an aftermarket intake system. The air flow values are determined when measured in the stock MAF housing. If you increase (or decrease) the size of the housing (piping) the MAF sensor resides, this will effect how much air is passed across the housing for a given MAF voltage. Realize the MAF sensor only "samples" a portion of the air passing through the housing. If you increase the diameter of the housing, more air will pass through for the same given voltage compared to stock. Thus, you need to increase or otherwise modify the Air Flow values for each given MAF voltage. Failure to do so will result in inaccurate A/F targets at both closed loop and Wide Open Throttle. To tune this table, start the vehicle, let it idle, and come to temperature...it may not perfectly idle, but just deal with it until it comes to temperature, 180-190 F. Use the dashboard to pull up your STFT, LTFT, MAF Voltage, and Coolant Temp. After the vehicle has come to temperature, re-set the ECU (you will be prompted to turn the vehicle off then back on). Start the engine again, and then watch your MAF voltage and A/F trims. You want the combination of your A/F trims to be as close to 0 as possible. EX = If your STFT is +5% and LTFT is 0, then simply look up the MAF Voltage, which should be close to 1.2-1.28 volts at idle, on the Mass Air Flow Sensor Calibration table and adjust the grams/sec value for that voltage up (+) until your combined fuel trims are 0 or close to zero. These adjustments can be made very easily by looking at the combined % correction of the STFT & LTFT. If that total is +6% then you can highlight the Mass Air Flow Sensor Calibration cell for that particular MAF voltage and hit the "M" key, you will then be prompted to enter a floating point value. The correct value for this particular situation would be 1.06; this adjustment will now tell your ECU for that particular MAF voltage you now have a 6% greater MASS of air entering the engine so 6% more mass of fuel should be injected. After this adjustment is made your A/F Trims should be close to zero. (If that total is -6% then you can highlight the Mass Air Flow Sensor Calibration cell for that particular MAF voltage and hit the "M" key, you will then be prompted to enter a floating point value. The correct value for this particular situation would be 0.94; this adjustment will now tell your ECU for that particular MAF voltage you now have 6% less MASS of air entering the engine so 6% less mass of fuel should be injected, bringing your fuel trims close to zero.) We suggest you shoot for a LTFT value of +/- 5% max. You may have to re-set your ECU throughout this process to remove any learned trims. To re-set your ECU, you can go to the "ECU" drop down menu and select the Reset ECU option. Do this along the Mass Air Flow Sensor Calibration table up to 2.6 volts or so ON A LOAD-BASED CHASSIS DYNO at part-throttle. If you have a properly designed intake system the Mass Air Flow Sensor Calibrations should look very similar to your stock Mass Air Flow Sensor Calibration graph under the table data. Be sure to keep your throttle movement as steady as possible during this process. Your trim values will always adjust back and forth (+/-); let them, that is what they are supposed to do. Do not beat yourself up trying to get them at exactly 0...it is impossible (temperature, weather, gasoline, etc. changes will not keep anything constant while you are tuning). If you are seeing plateaus, spikes, dips, or flat spots in the graph for the Mass Air Flow Sensor Calibration table then you know something is wrong...replace the intake system with a properly designed one. Continue adjustments until the car has a stable and expected A/F Ratio that matches your Low/High Octane Fuel tables. Patience is a key to producing a good Mass Air Flow Sensor Calibration table. Keep in mind not all intakes act the same. Some will have turbulence or poor flow issues at certain MAF voltages which will require additional tuning.

Developing a MAF sensor calibration for a non-stock intake:

Reset the ECU by disconnecting the battery and depressing the brake pedal. Wait about 5 minutes and reconnect the battery. This hard reset will clear any long term fuel trims in the ECU. Start the car and allow it to idle until it reaches operating temperature. Connect to the ECU using AccessTUNER software and data log long and short term fuel trims, mass air flow, and RPM. Drive the car without using heavy throttle for 15 minutes. Compare long term fuel trim with mass air flow. The easiest way to do this is to create a scatter plot of MAF grams per second on the x axis and long term fuel trim (LTFT) on the y axis.

This will allow you to visualize the learning breakpoints for the MAF curve. Once you get these data points you can then adjust the MAF curve at these areas by the average LTFT. This process will allow you to get to a point where the LTFT is small. A small fuel trim indicates that the MAF curve is accurately metering airflow. This process will only allow the lower load regions of the MAF curve to be calibrated. MAF sensor voltage above ~3 volts occurs during open loop fueling and there are no short term fuel trims applied here. The best way to adjust the higher voltage range of the MAF curve is to look at overall open loop fuel changes compared to a stock MAF equipped vehicle. In other words, if the vehicle is lean in open loop fueling conditions then add a small percentage of MAF grams per second to the MAF calibration. Repeat this process until long term fuel trims are low, short term trims are small, and open loop fueling is similar to a similarly equipped vehicle with a stock intake system.

Base Fuel Schedule Modifier

This value is used by the ECU in calculating the Load Axis for many tables (labeled as Theoretical Pulsewidth). This table does not normally need to be modified unless you have changed injectors and/or have added forced induction.

Tuning Tips – We have no tuning tips at this time.

Fuel Mix A, B, C

These tables are used by the ECU to achieve the A/F ratios found in the Primary Fuel table. You will need to make adjustments to these tables in the event you are not hitting the A/F ratios in your Primary Fuel table. These tables should be considered 'fine tuning' tables. Changes to these tables can directly affect your Theoretical Pulsewidth values.

Tuning Tips – None at this moment.

Fuel Multiplier

This value is directly applied to the MAF Calibration lookup to determine how much fuel to inject. This means it must be adjusted when injectors and/or MAF sensors have been changed. A larger value will result in longer injector pulsewidth.

Tuning Tips – This value will need to be decreased when installing larger than stock injectors.

Fuel Volumetric Efficiency

We currently do not have information for this table

Injector Latency A, B

These values represent fine tuning adjustments for fuel injector latency. These do not need to be adjusted unless changing fuel injectors.

Injector Latency Multiplier

This value is used to adjust the amount of injector latency (on-time or dwell) that will be added to the final latency value as it decreases from a set value of 14 Volts. This value will be used in conjunction with the Injector Latency Offset (described below) to determine the total Injector Latency to use.

Injector Latency Offset

This value is used to adjust the amount of injector latency that will used when the battery voltage is at 14 Volts. This value is used in conjuction with the Injector Latency Multiplier to determine the total Injector Latency to use.

Tuning Tips – Most fuel injector manufacturers will be able to provide you with this latency data and the voltage they are referenced at. Although, the drivers used to develop these latencies may be different than the injector drivers in the stock ECU. You can use the published values as a starting point and modify from there. Don't be afraid if your final values differ from what the manufacturer provided. To tune this table, we suggest that you first establish a good Injector Scale value.

One way to find the correct latency (or at least the latency that works best with the injector drivers in the ECU and your particular injectors) is to have your fuel system running stock fuel pressure and have the stock intake system installed then;

1st - set the proper scale value for the injectors you are using based of the scaler calculation.
2nd - start the engine and let the car warm up to temperature (coolant temperature between 180-195 F and intake air temperature +/- 15 degrees F of ambient temperature) then re-set the ECU so your fuel trims start at zero.
3rd - start the vehicle again and watch the **SUM of your fuel trims, Short-term Fuel Trim + Long-term Fuel Trim.**

If you see that the SUM of your fuel trims (A/F Trim Mimed. + LTFT) is positive then add injector latency until you see the SUM of your fuel trims come closer to zero. You will have to test this throughout the operating range of the engine...the entire MAF curve. Try to avoid sudden throttle movements during this process, you want to avoid seeing any corrections based on the Enrichment table settings.

If you see that the SUM of your fuel trims is negative then reduce injector latency until you see the SUM of your fuel trims comes closer to zero. You will have to test this throughout the operating range of the engine...the entire MAF curve. Try to avoid sudden throttle movements during this process, you want to avoid seeing any corrections based on the Tip-in Enrichment table settings.

This is part of a calibration process that should be able to get you close to the ideal settings necessary to properly control your fuel injectors. Please take into account that you will most likely have to fine tune the MAF calibration table as the final step. This will be necessary to match the characteristics of these new fuel injectors.

The Injector Latency values are used to represent the fuel injector size or flow rate. Any changes to these value will affect ALL tables within the ECU related to fuel delivery and load calculations. When using stock injectors with Petrol fuel, this value DOES NOT need to be altered.

Injector Scalar A, B

These values are used for fine tuning of the Fuel Multiplier in order to compensate for different than stock fuel injectors. This should only need to be modified once you have already set the Fuel Multiplier value accordingly.

Tuning Tips – None at this moment.

Primary Fuel

This table is referenced by RPM and Theoretical Pulsewidth (Engine Load). The table values represent the A/F Ratio you wish to run during open loop conditions. A lower value represents a richer A/F Mixture (more fuel).

Tuning Tips – In most cases it is safer to run the engine at the point where it makes the best powering using a richer A/F mixture. This means you find an A/F ratio where the engine makes peak torque for a given RPM. You may then find that the engine can run slightly leaner or slightly richer and still make the same power. In this scenario, it is often better to error on the side of slightly richer than leaner. This is particularly true at higher RPMs where a slightly richer A/F ratio can help cool the cylinder. This often results in cooler engine oil and coolant temperatures. An important factor is the vehicle is being operated at maximum load for long periods of time (ex: road racing, etc).

Doing so will normally not result in an appreciable decrease in fuel economy since this conditions are only meet when driving the car aggressively. During idle and cruising, the ECU uses a Closed Loop strategy designed to optimize fuel economy, not power.

Ignition Tables

Ignition Hi Det.

This is the primary ignition table used when the engine is experiencing a high level of detonation events (knocking). The table is referenced by RPM for the X-axis breakpoints and Theoretical Pulsewidth for the Y-axis breakpoints. Table values shown are **NOT** ignition advance degrees but rather an arbitrary value meant to represent the theoretical burn time for the fuel necessary to reach peak cylinder pressure at a Nissan dictated degrees ATDC for maximum torque. While not a hard-coded value meant to represent an exact Degrees BTDC (before top dead center), you can still tune in a similar fashion. The higher value, the earlier the ignition event occurs; the lower value, the later the ignition event occurs.

Tuning Tips – Since this table is used only when the engine has experienced excessive detonation (knocking), we highly recommend that you do not make it overly aggressive. This table is meant to help protect the engine. Tuning this table too aggressive may result in engine damage.

Knock Overlay Hi Det. Map

This table represents when the ECU will utilize the knock sensor to make Ignition Advance corrections. It directly relates to the Hi Det. Ignition table. The values in the table can either be “1” meaning the Knock Sensor is being used by the ECU or “0” meaning the Knock Sensor data will be ignored.

Tuning Tips – This table does not normally need to be adjusted from stock. Take great care in adjusting this table as excessive detonation can damage your engine. The knock sensor is meant to protect the engine, not rob power. If you feel the knock sensor is being “overly sensitive”, there may be another root case to that issue.

Knock Overlay Primary A, B

These tables represents when the ECU will utilize the knock sensor to make Ignition Advance corrections. It directly relates to the Primary Ignition A or B tables. The values in the table can either be “1” meaning the Knock Sensor is being used by the ECU or “0” meaning the Knock Sensor data will be ignored.

Tuning Tips – These tables do not normally need to be adjusted from stock. Take great care in adjusting these tables as excessive detonation can damage your engine. The knock sensor is meant to protect the engine, not rob power. If you feel the knock sensor is being “overly sensitive”, there may be another root case to that issue.

Primary Ignition A, B

This is the primary ignition table used when the engine is **NOT** experiencing a high level of detonation events (knocking). The table is referenced by RPM for the X-axis breakpoints and Theoretical Pulsewidth (Load) for the Y-axis breakpoints. Table values shown are **NOT** ignition advance degrees but rather an arbitrary value meant to represent the theoretical burn time for the fuel necessary to reach peak cylinder pressure at a Nissan dictated degrees ATDC for maximum torque. While not a hard-coded value meant to represent an exact Degrees BTDC (before top dead center), you can still tune in a similar fashion. The higher value, the earlier the ignition event occurs; the lower value, the later the ignition event occurs.

Tuning Tips – Additional power can be realized on naturally aspirated vehicles by increasing the table values (timing) throughout the mid and high range RPM and TP (Load) addresses. The key is to make small changes in a very progressive manner. When using a dyno to quantify the power changes from your ignition advance adjustment, keep in mind that you will want to make multiple runs with the same Map Data until power stabilizes. The ECU uses some degree of "learning" so the first pull you make may not be an accurate representation of how the car will perform on the street after a few drive cycles.

For forced inducted vehicles, you will most likely want to decrease the values in this table in order to reduce ignition advance. The degree of which will depend greatly on the type of forced induction you are using as well as the fuel. There is no hard and fast rule as to how much or where that will work for every vehicle.

Limits Tables

Rev. Limit – Fuel Cut

These values represent the maximum Engine RPM allowed before the ECU will cut off fuel. If the Engine RPMs exceed these values, the ECU will cut fuel momentarily in order to stop the engine from revving beyond the limit. This is considered a "hard" limit, meaning it can be very noticeably felt when hit.

Tuning Tips – On a stock engine, it is normally not recommended to raise the rev limit much higher than the factory recommendation. On lower mileage stock engines, you may be able to safely run a few hundred RPMs higher than the stock limit. However, keep in mind that as the engine's mileage increases, some components such as valve springs can begin to degrade resulting in a lower possible 'safe' Rev Limit value. Always use common sense and caution when raising the limiter. If you are no longer making power efficiently at a high RPM, it may not be worth the risk in trying to rev the engine higher.

We recommend this limit be set slightly higher than the Rev. Limit – Throttle Limit described below.

Rev. Limit - Throttle Limit

These values represent the maximum Engine RPM allowed before the ECU will begin closing the throttle. This is considered a softer rev limit than a fuel cut, as the engine will be starved of air progressively rather than fuel instantly in an effort to stop the Engine RPMs from exceeding the value.

Tuning Tips – Set this value slightly below the Rev. Limit – Fuel Cut values if you'd like to soften the effect of the Rev Limiter.

Rev. Limit B, C

Additional Rev. Limits active only in some models based on additional conditions.

Tuning Tips – Not normally used on most models. Set the values the same as the Rev. Limit – Fuel Cut to avoid any instances of the limit values becoming active unexpectedly.

Rev. Limp Home

Maximum Engine Speed allowed while in 'Limp Home' mode.

Tuning Tips – None at this moment.

Speed Limit A, B, C

These values represent the maximum vehicle speed allowed before fuel cut and/or throttle closure as required to limit vehicle speed.

Tuning Tips – Set accordingly.

Speed Limit Hysteresis

The change necessary to re-enable fuel or open throttle after the speed limit has been exceeded. For example, if you set the speed limiter to 100 mph and the Speed Limit Hysteresis to 5 mph, then in the event you exceed 100 mph, the ECU will cut power to the engine (fuel or throttle) until the speed drops below 95 mph.

Tuning Tips – None at this moment.

Miscellaneous Tables

Idle Speed Table A, B, C, D

This table allows you to set the idle targets. The breakpoints for this table are water temperature levels.

Tuning Tips – Set accordingly.

Throttle Tables

Throttle Table 1

Throttle Table 2

Throttle Table 3

Throttle Table 4

Throttle Table 5

Throttle Table 6

Throttle Table 7

Throttle Table 8

These tables are used to translate the Accelerator Pedal Position to a desired throttle plate pedal position. They may be used to alter the sensitivity of the pedal for a desired effect.

Tuning Tips – Driver preference will most likely dictate how these tables are calibrated.
